

## **ISEL: An e-Taxation System for Employers**

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**Abstract:** In 2008 the State of Geneva modified its regulation on taxation at source in order to collect electronic fiscal data from employers. Indeed the latter provide data on their employees directly to the tax administration (AFC) and furthermore pay taxes to the State on behalf of their employees. They subtract the corresponding amounts from employees' income and refund that money to the fiscal administration. The taxation at source system is applied to foreigners who work in Switzerland or who receive Swiss pensions, to people who live in Geneva but work in other Cantons, as well as to performers, artists or speakers who work occasionally in Geneva. More than 12'000 companies and 117'000 employees are concerned by the scheme, and large companies provide data on several thousand employees. In the past these files provided by employers were handled semi-automatically by the AFC (at best). The new system (called ISEL for Impôt à la Source En Ligne) offers employers two electronic channels to provide data on employees: file transfer (.XSD) and internet e-form. This case study describes the ISEL project and its context, and discusses the issues raised by the introduction of this e-taxation system. On the human side, our paper takes a qualitative approach, based on interviews of various stakeholders involved in the project. They were asked questions on ISEL's functionality, usability, performance, and so on. On the technical side, the paper presents the architecting principles of the e-government approach in Geneva (Legality, Responsibility, Transparency and Symmetry) and the workflow that was implemented on top of AFC's legacy system.

**Keywords:** private public partnership, tax collection, e-services, e-government, data exchange, architecture, usability.

### **1. Introduction**

This paper is a case-study on the introduction of the ISEL information system provided to employers by the fiscal administration of Geneva. ISEL stands for "Impôt à la source en ligne" and is an e-government transaction facility for employers who send data on their employees and pay income taxes on their behalf. It is organised as follows: Section 2 sets the context of e-government in Geneva, Section 3 discusses the ISEL project in terms of organisational and business issues, and Section 4 describes the general architectural principles of the project. We conclude this paper with lessons learned during the project and with perspectives on future e-government developments in Geneva, in particular e-taxation.

### **2. E-government program in Geneva**

Without going into a detailed definition of e-government, let us say that it is the domain of delivering added value services to citizens and businesses through electronic channels, and particularly the internet. "Added value" means that the end user can measure a difference in terms of service quality and comfort, or necessary effort, delay, and cost, between e-services and services provided through traditional channels.

While ranking among the top nations regarding its capability in the information society (IBM Institute for Business Value 2007, Dutta 2008), Switzerland has been slow to develop e-government (Capgemini 2006). It is quite likely that the main reason for this situation is its complex structure of authority with three levels of government (federal, cantonal and communal) that are sovereign in their own areas of competency and regulation.

On the other hand the Canton of Geneva is a leader in the development of e-democracy, notably with its project of internet voting (Chevallier 2006). Geneva is currently implementing a large e-government program, with a budget of CHF 30 millions that was voted by the Parliament in June 2008 (Secrétariat du Grand Conseil 2008). Moreover the Canton is considering the opportunity to use public-private partnerships (US Dept of Transportation 2007) to develop and manage given e-government services (Sandoz 2008).

In a traditional PPP, a public entity delegates the construction of an infrastructure to a private contractor who finances the asset and manages it over a predefined interval of time. During this period, the private contractor delivers a service to users of the asset and receives payment in order to make a profit. The asset is usually “brick-and-mortar”: a school, a road, a bridge or a hospital. Services include functional maintenance of the asset, but not for example teaching in schools or providing medical care in hospitals. In this sense, the contractor is responsible towards the government for functional capability, but the government is responsible towards the end-user for delivery of the service and conformity with regulation. Geneva is testing this model in a domain where assets are information systems (i.e. dematerialized) and public services are provided to users through electronic channels.

This kind of PPP is not related to outsourcing computer and network infrastructures to private contractors for the benefit of public administrations. We consider the situation where a private third party delivers a public service to an end-user (citizen or business) on behalf of a public agency, and under the following conditions:

- The private partner is responsible towards the public agency for service production and delivery (functional capability), whereas the public agency is responsible towards the end-user for effective delivery (conformity);
- The public agency retains control of all sensitive information concerning the end-user and is responsible for the enforcement of privacy protection.

These PPP conditions are applied to the process of fiscal data and tax collection by employers in the context of taxation at source described in the next section.

### **3. The ISEL Project**

Although several European countries have generalized the use of systems similar to taxation at source, this is not the case in Switzerland where most taxpayers declare their incomes and receive bills sent by their local tax administration. In most Swiss cantons taxpayers can choose to pay taxes at once (usually with a small tax rebate) or progressively during the year (by making between six and twelve down-payments). However certain categories of taxpayers are not offered this possibility and their taxes are collected directly from their income by employers. We will not go into the details of all categories and cases concerned with taxation at source, but generally this system is applied to foreigners who work in Switzerland or who receive Swiss pensions, to people who live in Geneva but work in other cantons, as well as to performers, artists or speakers who work occasionally in Geneva. The volume of taxation at source is significant, with 12'500 companies providing fiscal data and paying taxes on behalf of 117'000 employees. This scheme is particularly important in Geneva for several reasons: Geneva is a “city-canton” with a high level of value-adding jobs and a need for skilled work forces, attracting many well-trained foreign workers; over 95% of Geneva's borderline is international; and the Canton hosts many international organizations.

The tax administration (AFC) of the Canton of Geneva has a department dedicated to assessing and managing taxation at source. This group is made of 8 tax assessors that handle employers' data and of 15 assessors that work on employees' files. Altogether with managers and administrative collaborators ISEL is available to 30 users within the administration.

The basic scheme is as follows: employers collect a fixed amount of their employees' income directly and pay the collected sums globally to the state (minus a small fee for the work this operation requires). In order for the AFC to control and manage taxes on an individual basis, employers also provide data such as annual listings of all employees concerned and of their income, as well as the taxation category they belong to, civil status, number of children, etc. Until the beginning of fiscal year 2009, companies could use a software package provided by the AFC on CD-ROM (the package called GeTIS was used by 52% of employers) or work with paper forms. Paper forms were scanned by the AFC without optical character recognition, and the resulting images stored electronically in the employer's file. The forms generated by GeTIS include a code-bar that is scanned in order to integrate partial data directly in the application used by tax assessors to handle and verify employees' data. At the time it was introduced, GeTIS was very well received by small and medium companies that did not use a software application or ERP component for human resource management. Large employers with several thousands taxpayers at source did not use it because it would have implied formatting and typing all HR data twice. Therefore they printed their own forms out from their existing systems. Since several employers declare over one thousand employees taxed at source and the largest single

employer has more than 5'000 taxpayers to declare, one can imagine the volume of paper to be printed, transmitted to the AFC and scanned. Furthermore, there were no standard forms (only a specification of required data), meaning that the AFC would receive many different formats of forms. Consequently a small number of declarations encompassed the majority of taxpayers' data but were not adapted to automatic processing. Although transmission processes described here were not very efficient, they did not constitute the main issue for the AFC. Indeed its major problem was to have more complete data in electronic format in order to be able to provide them directly to the Swiss federal administration, to other cantons and to communes. Previously it was not possible to do this automatically because data were either incomplete (code-bar) or not exploitable (image files).

Tax assessors use a system called R-IS to handle source taxpayers' data: when errors are found or modifications have to be made, corrective lists are generated this application and sent back to employers. The R-IS system was rebuilt as part of the reform of the financial information system of the State of Geneva. In parallel to this very large re-engineering project, various stakeholders came to the conclusion that R-IS could not be optimally efficient if employers could not provide data electronically and continued to send in paper forms. This was nevertheless still required by regulation and in 2008 the fiscal law was adapted in order to allow electronic data transmission. Regulators also chose to impose a standard paper form for employers who did not want to use electronic data transmission. R-IS is out of the scope of this case study and is not described in more detail in this paper.

ISEL is the first e-service developed within the global Geneva e-government program and e-taxation is a strong priority for the State of Geneva. Indeed an on-line tax declaration for all tax-payers is being developed in 2009 and it should be introduced during the 2010 fiscal year. ISEL is designed so that employers can either use (online) e-forms to enter their data or upload standardized XML files. The use of GeTIS is still allowed in 2009 but will be discarded in 2010, as its functionality is replaced by the web interface. For the time being, corrective lists generated by tax assessors are still sent back manually (for conformity reasons) but it is planned that electronic data exchange will become bidirectional in 2010. ISEL was deployed in production in December 2008 and opened up to employers in January 2009. After two weeks of operations 1'500 companies (out of 12'500) had registered to use ISEL and almost 200 employers had used the e-forms to enter data directly from the internet. This is a very good result considering that the AFC had kept a relatively low marketing profile and that the registration procedure is rather complicated for employers (because of security measures related to Swiss and Geneva fiscal secrecy).

#### **4. A First Assessment of ISEL**

The ISEL system has been in production for six weeks at the time of this paper's writing. It is therefore difficult to assess the impact of ISEL on a statistic and comparative basis with previous fiscal years. However we interviewed three groups of stakeholders that took part in the development, testing and integration phases of the application: strategic management, business analysts, and end users (both tax assessors and employers). In order to structure these interviews, we used the FURPS+ model (Functionality, Usability, Reliability, Performance, Supportability), developed by Hewlett Packard and now an ISO standard. The results below are rather the authors' interpretation of qualitative data than a scientific analysis. We do however believe that it would not make sense to go into detailed research at this time of the project, and that what came out of these interviews already provides interesting insights.

In terms of AFC's strategic objectives, ISEL was designed to answer two main requirements. First, as there are more and more taxpayers paying their taxes at source, it was necessary to deploy a more efficient system in order to handle the additional amount of data transmitted to the AFC (with the same human resources). The AFC has to transmit selected data further on to the federal administration, to other cantons, to communes, or back to employers. Until now, as most data were not available electronically (or at the best as scanned images), they had to be entered in the R-IS system manually. On the technical side, these goals were fully reached as ISEL does not present any major flaw and as data are integrated without problems in the R-IS application (see next section for the technical aspects of the project). From the managerial perspective, the AFC still has to bring more employers to register on ISEL (in the first few weeks, about 10% registered to use ISEL). We think it is a matter of time and of good communication (without additional incentives) until a majority of employers use the system and we do not see any severe potential problems here.

In terms of business analysis, ISEL benefited from all previous work that was done to re-engineer the global financial system: the main representative of users participated in both projects and was thus able to match requirements, particularly regarding data models. Given this and the fact that data exchange is not very complex in terms of business rules, there is not much more to say about it.

End users from the AFC (tax assessors) only used ISEL directly during the testing phase, through a dedicated user interface that allowed them to control uploaded data. As ISEL is now in production, they do not “see” it any more because data exchange is made automatically. Selected users will however access ISEL directly in order to enter parameters such as user rights or reference data, but this is yet to be implemented; at the moment developers manage the application directly. End users listed several secondary business needs that were not covered by ISEL at the time of deployment. These issues were identified from the start and management decided not to implement them (at least for the time being) because of their complexity or cost. End users also stated that the remarks and suggestions they made during the testing phase were mostly taken into account.

With regards to the previous paragraph, ISEL's end-users really are the employers and not the tax assessors. Given the short time of ISEL being on-line, it was difficult for us to interview employers in order to get their feed-back. We assume that most employers who used e-forms in ISEL were already users of the GeTIS package. If this is correct, the change to online data transmission was certainly no issue for them as on-line and GeTIS forms are similar. In order to get feed-back on XML file exchange, we met the chief HR executive of one of the largest employers in Geneva (several thousand employees subject to taxation at source). This organisation participated in the preliminary tests, so it already had enough experience with ISEL in order to be able to answer our questions. In this executive's opinion, ISEL only brought productivity gains for the AFC and, on the long run, it was a “zero sum” gain for his organisation. On the short term it was even a loss because it was necessary to modify existing procedures. However his organisation took this opportunity to suggest an administrative simplification: merging data from two existing and required income certificates (one at federal level and one for the Canton of Geneva) into a single one (on the model of the federal certificate with some extra cantonal data). As this trade-off was accepted, he considered that it was a “win-win” game. On the functional level he made two interesting remarks. He stated that the ISEL system would only have a true added value for him when it became bidirectional (planned for 2010): at the moment his organisation has to handle manually hundreds of cases where special business rules from the AFC apply. As they do not get this information (or through employees, with a delay), this generates errors and exceptions in their system. His second remark was on new data required by the AFC: on the one hand it takes a long time to get correct information and on the other, it could be delicate in some cases for an organisation to ask its employees. For example, if a person officially lives with a partner without being married (same or different sex), it has an impact on taxation, but one might not want his/her employer to know with whom one lives. These aspects must be accounted for when building the e-government platform, and they are discussed in the following section.

## **5. Implementation of ISEL on the e-government platform**

### **5.1 Architecting principles**

A government is a working model of society: every regulatory aspect is modelled, implemented and operated in the administration, and there are many interactions between administrations and users. The standard repository of procedures of Swiss public administrations (eCH 2007) describes ca. 800 official procedures that apply to the level of authority we consider in this paper (Cantons).

Various elements of society interact with public administrations over technical and organizational channels, using specific rules and procedures. Organizational channels, rules and procedures change regularly due to social evolution and new legislation, whereas the set of technical channels (teller, postal mail, telephone, and fax) now includes ICT and internet.

From a technical point of view, e-government means integrating these new channels into the activities of public authorities and it requires additional resources, interfaces, and procedures. In order to build an *e-government platform* (EGP) it is necessary to identify these necessary components, to implement them, and to integrate them. We identified two generic approaches for building this platform, which we called “parts of” and “the whole of”.

There is a fundamental difference between the “parts of” and the “the whole of” approaches. The former considers an EGP as the juxtaposition of components that each deal with some part of e-government, the sum of these parts and of their effects being the expected result. This leads to the definition of incremental strategies for e-government: programs “start small” with easy to deliver services, such as communication with citizens through a portal. However in our experience most incremental projects encounter difficulties over time. The latter considers an EGP as a global system from the start. Architecting complex systems is a delicate and risky task (Maier 2000): because of the greater importance of component interactions, it is impossible to foresee how well the design will work, if at all, before an initial version of the system is completed and tested. We chose this approach in the Geneva EGP program, building on the successful implementation of Geneva’s e-voting project between 2002 and 2005.

To support this holistic approach of architecture we used the following design principles: *Legality*, *Responsibility*, *Transparency* and *Symmetry*. We believe that the wording of these principles is intelligible to policymakers (i.e. people having to handle issues of e-government such as complexity and scale, costs, trust and expectations of citizens, dissemination and impact of technology, and so on), and to end-users as well.

Our baseline for e-government is the possibility for external actors to interact with an administration through the internet. An external actor can be a citizen, a non-resident, a business, a NGO, an association, another administration, but also a machine or any identified or unidentified entity which interact through the internet with the considered EGP. We call such an actor a user. We do not assume existence of any contract between the administration and the user.

The first principle aims at protecting the user’s legal and civil rights. It addresses two fundamental changes brought by e-government, i.e. real-time vs. differed operation and automatic vs. manual treatment.

*Legality principle* (LP): all services delivered to users through an EGP interface and their consequences must be legal and comply with users’ legal and civil rights within the jurisdictions under which the referential operates. Under LP a user cannot be led to execute an interactive operation on the EGP if the underlying application is not certified for LP. Consequently, in practice, it is impossible to authorize interactive access by users to legacy applications on the EGP. Interactive operations must be simple and traceable (e.g. upload a file, trigger a transition in a workflow). Expected effects must be certified.

The second principle deals with the question “Who is the user?” This is a complex matter, often oversimplified by security technicians who treat the problem at the identification and authentication level of enterprise directories, using logins of physical persons as a basis for profile and role management. In e-government this is difficult because citizens or companies usually have no contractual relations with public administrations, as this is the case between a company and its employees. Moreover citizens move, get married, change their names; companies also change; people might interact with an administration in their own name, on behalf of their employers or of their customers, or of the NGO’s they are active in. This makes it even more difficult to manage identification and authentication, logins, profiles and roles. The complexity of these identity management processes induces very high costs and raises security issues. Moreover these processes do not respect LP.

*Responsibility principle* (RP): each operation executed on the EGP has to be attributed to a unique identified legal entity, which is legally responsible for the execution of the considered operation and for all its publicized and certified consequences. The legal entity can be an individual (i.e. a resident within a jurisdiction where the authority can legally file a claim against the user in relation to the execution of the operation) or a corporation (company, NGO, etc.), or the government itself. If a user is untraceable (e.g. a child or a resident outside the authority’s jurisdiction), the responsible entity will be the state.

The next principle targets ease of use. In traditional forms of government, knowledge used by civil servants to fulfil a request is usually very detailed: terminology, regulatory and organizational aspects, knowledge of people and services to forward demands and records to, legacy applications used during the procedure, etc. An employee might need years of training to be efficient, and usually in only

one service. If one takes human actors out of the process, this missing knowledge becomes a problem. Shifting the necessity to know to the user is not only disloyal, but also impossible in practice. Consequently, the EGP must be architected so that this knowledge becomes unnecessary. This seems impossible, but in fact it is not. Because the complexity of working organizations is often due to organic growth (Mintzberg 1989), IT and process re-engineering help formalizing large portions of this knowledge. This design step is comparable to what deploying ATM's did to the banking industry. Our task is to make it possible on the EGP.

*Transparency principle (TP)*: organizational characteristics (of actors) which are not explicitly necessary to perform an operation on the EGP are not reflected in that operation. As a consequence, any function which is used by more than one agency (e.g. login, payment, trace, geo-localization, directory, support, delegation, etc.) is seen by users as one service instance. Such services are called transversal. All transversal services must be implemented in the EGP which becomes the central locus for dematerializing administrative processes inside the administration.

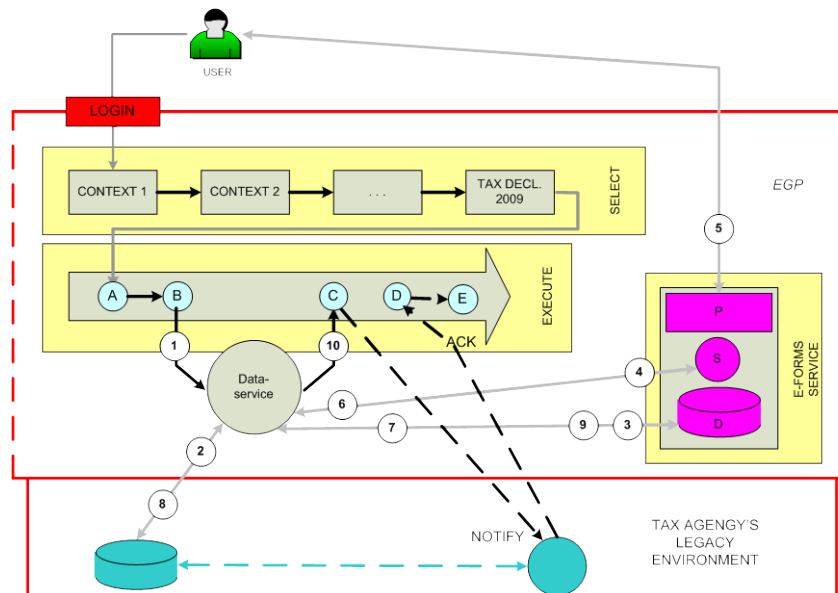
The last principle basically states that anything the government is not mandated to do, it should be able not to do.

*Symmetry principle (SP)*: any function that is necessary for an EGP to operate correctly, but that is not directly determined by a mandate of the state, should be implemented on the EGP, if at all, in a way that an external service provider can supply the service. As a simple example, one can think of the function of completing e-forms. A service is necessary to display form frames with fields that users fill in. An online set of rules is applied to verify that syntax and low level semantics of provided information are correct. The service provides backup for partially completed forms that the user can come back to later (also in case of a failure), and for archiving completed forms. If the EGP is to operate correctly, this kind of service is necessary. If the service is provided by the EGP itself, it should be unique (due to TP) and supply every form the administration requires from its users. However the mandatory characteristic of the state with regards to this service is not to enable users to complete online forms, but to enable users to transfer electronic data. According to SP the e-forms service should be implemented on the EGP so that an external service provider can do the same. This comprises technical aspects like invocation of the service from the EGP and data transfer to the EGP, as well as functional aspects like publishing verification rules, and data or file structures. These characteristics were realized from the start in the ISEL project.

## **5.2 Application**

ISEL transactions are implemented through the EGP above the tax agency's legacy system, and they respect the four principles defined in the previous section. In particular, EGP applications implement a handshake protocol between user and legacy systems which respects LP, RP and TP. The user can subscribe to an external e-forms service or use the platform's own. In this sense, SP is respected. These elements are illustrated in Figure 1.

The workflow used to implement the transaction depends on the underlying functionality (transmitting a taxation declaration). However this consists of a few simple steps: A) opening the case (except for new companies, most of the information will be supplied by the AFC using the data service to present it to the user's execution context); B) completing the forms and uploading documents; C) formally committing the case; D) receiving an acknowledgement; and E) receiving the tax decision and invoice. Further steps (appealing a decision, paying taxes online, etc.) are implemented in other generic workflows. Implementing this instance of a procedure in the EGP provides a generic solution to most administrative procedures of the "declaration" type.



**Figure 1:** Taxation at source declaration transaction

The numbered steps in the figure indicate progress in the automatic handshake protocol between the EGP's data-service and the legacy application. This requires an integration effort between the EGP's back-end system and the legacy environment. It must be supplied by all concerned agencies for every online transaction, but is done using a uniform model.

In summary, the EGP provides transversal functions (login, resource control, delegation, state transition, traceability, etc.); public agencies define specifications for forms, transactions' workflow, and integration with legacy systems through the implementation of the handshake protocols; external service providers may develop their own e-forms for these transactions. Transversal functions are developed and executed in the EGP and vertical functions in the agencies' legacy environments: this provides a generic framework for the implementation of e-government distributed multipartite asynchronous procedures, which is among the most difficult technical problems of e-government.

## 6. Conclusion

ISEL is the first electronic service deployed on Geneva's new e-government platform and thus the first implementation of Geneva's theoretical e-government design principles, namely Legality, Responsibility, Transparency and Symmetry. It is therefore an important test for these design principles and that is why we wanted to have feedback on ISEL from various stakeholders (management, business analysts and end users).

Although ISEL has not been running for very long, our survey already brought us interesting findings and will be quite useful for our further work. Indeed we plan on following the global e-government program of Canton Geneva, as ISEL will be followed by 9 other e-services in the coming years (and 25 additional ones are planned).

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